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The objective of air defense is to provide the force with protection from the enemy air and missile attack. They prevent the enemy from separating friendly forces while freeing the commander to fully synchronize maneuver and firepower. The air defense combat function contributes to joint theater counterair operations and to joint theater missile defense. Theater counterair operations protect the force from attack by enemy fixed- and rotary-wing aircraft and unmanned aerial vehicles (UAVs). Theater missile defense protects the force and critical assets from attack by theater missiles, which include ballistic missiles, cruise missiles (CMs), and tactical air-to-surface missiles (TASMs).

An effective system for the dissemination of timely early warning greatly enhances the effectiveness of both active and passive air defense measures.

### **PASSIVE AND ACTIVE AIR DEFENSE (FM 71-2, FM 71-3, FM 7-20, FM 44-64, FM 44-18)**

#### **■ PASSIVE MEASURES ■**

Passive air defense measures consist of all the measures taken to preclude the enemy from locating the unit. The task force should use the following guidelines.

- **When stopped, occupy positions that offer natural cover and concealment, dig in, and camouflage vehicles. When moving, travel by covered and concealed routes.**
- **Disperse vehicles as much as possible.**
- **Wipe out track marks that lead to a position.**
- **If moving when an enemy aircraft attacks, disperse and seek cover and concealment.**

**continued**

- **Do not fire on a hostile fixed-wing aircraft unless it has identified a friendly vehicle or location.**
- **Require air guards in each section or in each position.**
- **Establish an air warning system in the SOP.**

## ■ ACTIVE MEASURES ■

Organic individual and crew-served weapons, and nonorganic supporting air defense artillery units, provide air defense for the task force.

## RELATIONSHIPS AND MISSIONS

The brigade commander may retain all available ADA under his control, or assign a portion of the ADA to the task force with a designated support relationship, such as DS or attached. Normal task force organization may include a section of Stingers and a platoon of air defense gun systems. The senior air defense officer functions as a special staff officer during the planning process.

To properly employ air defense assets, the commander must:

- Assign tactical missions to the ADA element.
- Establish priorities for air defense; for example, main effort, choke points, axes.

The ADA unit leader positions his weapons as necessary to support the task force.

## SYSTEMS AND CHARACTERISTICS

Air defense weapons systems most often placed in support of the task force are the Stinger, the Bradley Stinger Fighting Vehicle-Enhanced, and the Avenger.

## ■ STINGER ■

The Stinger, a man-portable air defense system (MANPADS), is used to counter high-performance, low-level, ground attack aircraft, helicopters, and observation and transport aircraft.

## ■ BRADLEY STINGER FIGHTING VEHICLE-ENHANCED ■

The BSFV-E is the M2A2 Bradley Infantry Fighting Vehicle. The initial BSFV is equipped with a 25-mm main gun, 7.62-mm coaxial machine gun, externally mounted tube launched, optically tracked, wire-guided (TOW) missile launcher, and two M257 smoke grenade launchers. The BSFV-E is an air defense system based on minimal upgrades to the BSFV. These upgrades will give the currently fielded BSFV (fitted with internal Stinger missile racks) a capability to effectively engage air threats while the crew remains under the protection of armor.

## ■ AVENGER ■

The Avenger provides rapid reaction and multiple engagements within seconds. Avengers are capable of 360 degree coverage and have an acquisition range in excess of 10 kilometers. They should be positioned with Stinger teams for added asset protection. The Avenger's limited engagement range against UAVs may be overcome by sound intelligence preparation of the battle-field (IPB), positioning well forward of the defended asset and the ability of the Avenger to receive and use a cue. Cueing comes from ground based sensors (GBS) or its organic sensor.

### WEAPONS CONTROL

Air defense rules of engagement are directives that specify the circumstances under which an aircraft may be engaged. Weapons control status describes the relative degree of control exercised over air defense weapons; the three are:

- **WEAPONS FREE:** May fire at any aircraft not positively identified as friendly (least restrictive).
- **WEAPONSTIGHT:** May fire only at aircraft positively identified as hostile.
- **WEAPONS HOLD:** Do not fire except in self-defense or in response to a formal order (most restrictive).

The airspace management elements at division and corps disseminate weapons control status.

### EARLY WARNING

Air defense warnings (ADW) represent the commander's evaluation of the probability of air attack within the AO. ADWs are usually issued by the area AD commander but a higher state of warning can be directed by a local commander.

The early warning system for the division is standardized throughout the division and should be published in the TF SOP. Standard air defense warnings (alert postures) are:

- **RED:** Attack by aircraft or missiles is imminent or in progress.
- **YELLOW:** Attack by aircraft or missiles is probable.
- **WHITE:** Attack by aircraft or missiles is improbable.

### EMPLOYMENT CONSIDERATIONS

Joint efforts of the S2, AD officer, and ALO determine enemy air avenues of approach and disseminate these to subordinates. Primary characteristics of air avenues are:

- **Rotary & fixed-wing aircraft use terrain mask to avoid ADA fires & radar detection.**
- **Overflight of friendly positions is avoided.**
- **Major terrain features are used to assist in navigation.**

Based on the commander's priorities, the AD leader attempts to satisfy as many of the following employment guidelines as possible:

- **Balanced fires.**
- **Weighted coverage against the most likely approach.**
- **Early engagement.**
- **Defense in depth.**
- **Mutual support.**
- **Overlapping fires.**

ADA Class V immediate resupply should be carried in the task force combat trains.

### **COMMANDER'S GUIDANCE FOR AIR DEFENSE**

The commander's guidance for air defense should include, at a minimum, a task purpose and priorities. The guidance should specifically do the following:

- **Address each ADA system available.**
- **Establish air defense priorities for each phase of the operation using criticality, vulnerability, recuperability, and threat.**

### **AIR DEFENSE PLANNING CONSIDERATIONS**

The brigade or task force commander establishes air defense priorities based on the results of the aerial IPB. The priorities are included in the commander's intent and evaluation scheme of maneuver.

Threat attack helicopters with stand-off ATGM capabilities are employed in pairs.

Threat CAS capability includes smart munitions and other advanced ordnance loads.

The task force employs ADA support based on the commander's air defense priorities.

ADA elements supporting the task force can be either kept under the centralized control of the platoon leader or attached to company teams.

- Centralized control is favored because it allows a better coordination of ADA support.
- Attaching Stingers is appropriate in mobile operations to get Stinger coverage well forward and allow the Stinger gunners to move under armor protection.

The normal mission given to ADA elements is general support to the task force with priorities to a unit or to tasks.

### ADA ORGANIZATION FOR COMBAT (ST 100-3)

To organize for combat, ADA seeks to deploy the best possible weapons mass and mix to support the scheme of maneuver. The mission of the supported force, its concept of operation, and the tactical situation must be understood before developing an ADA organization for combat.

### ORGANIZING FOR COMBAT (FUNDAMENTALS) (ST 100-3)

*Air defense (AD) priorities.* The appropriate force commander establishes air defense priorities to ensure effective ADA support for his operations. The development of AD priorities begins with the staff estimate. The ADA commander and the force G3/S3 develop AD priorities for all courses of action. AD priority may be to the maneuver forces and forward combat service support (CSS) elements in the offense and to covering forces, logistics, fire support, and command and control facilities in the defense. To develop a priority list, AD planners assess each asset as a potential target from the viewpoint of the enemy. Based on the intelligence preparation of the battlefield (IBP) of the total battle (air and land) they consider -

- **Criticality.** How critical is the asset to mission accomplishment?
- **Vulnerability.** How susceptible is the asset to damage or destruction by air attack?
- **Threat.** What are the enemy capabilities to attack the asset?
- **Recuperability.** How well can an asset recover from inflicted damage?

*Available ADA support to the scheme of maneuver.* The ADA commander must retain sufficient control to react to rapid changes in AD priorities that are caused by changes in the force commander's scheme of maneuver.

### EMPLOYMENT PRINCIPLES (ST 100-3)

Four fundamental principles form the basis for accomplishing the ADA objective. They are -

- **Weapons mass:** a concentration of air defense combat power achieved by assigning sufficient fire power to protect the force or asset from multiple threats
- **Weapons mix:** employment of a combination of weapon and sensor systems
- **Mobility:** the ability of a unit to maneuver as easily as the supported maneuver unit
- **Integration:** coordination of effort and unity of action which maximizes operational effectiveness

## COMMAND AND SUPPORT RELATIONSHIPS

Relationships between air defense units and other units may be either command or support. The actual relationship chosen is dictated by the estimate of the situation made by the G3 in coordination with the force air defense commander.

- **Support relationships.** Air defense units can have any one of four support relationships assigned. A brief description of the individual missions follows:
  - **General support.** An ADA unit with a GS mission provides support for the force as a whole. It is not committed to any specific element of the supported force.
  - **General support-reinforcing.** An ADA unit with a GSR mission provides coverage for the force as a whole and augments the coverage of another ADA unit. GSR units are not committed to any specific element of the force.
  - **Reinforcing.** An ADA unit with an R mission augments the coverage of another ADA unit that is committed to a specific element of the force.
  - **Direct Support.** An ADA unit with a DS mission provides dedicated air defense for a specific element of the force that does not have assigned or attached ADA. The DS unit is committed to the support of a specific element of the force.

Command and control relationships for air defense artillery (ADA) units are established by the joint force land component commander and corps/division commanders according to joint doctrine. ADA forces assigned to corps and lower maneuver elements are under the operational control of the echelon commander. At echelons above corps, ADA forces are normally under the operational control of the joint force land component commander (JFLCC).

Special command relationships can be formed by placing the ADA unit under tactical control (TACON), operational control (OPCON) or attachment to another unit. Support relationships may also be used.

SUPPORTED RELATIONSHIPS (FM 44-100)				
ISSUE	DS	GS	REINFORCING	GSR
WHO ESTABLISHES AD PRIORITIES?	THE SUPPORTED CDR	THE ADA CDR WHO ESTABLISHED THE SUPPORT RELATIONSHIP	THE SUPPORTED CDR	THE ADA CDR WHO ESTABLISHED THE SUPPORT RELATIONSHIP
WHO POSITIONS ADA FIRE UNITS?	ADA CDR WITH APPROVAL OF THE SUPPORTED CDR	ADA CDR IN COORDINATION WITH LOCAL GROUND CDR	ADA CDR WITH APPROVAL OF REINFORCED ADA CDR	ADA CDR IN COORDINATION WITH REINFORCED ADA CDR
WHO COORDINATES FOR TERRAIN USED BY ADA FIRE UNITS?	THE SUPPORTING ADA CDR	THE ADA CDR WHO ESTABLISHED THE SUPPORT RELATIONSHIP	THE REINFORCED ADA CDR	THE ADA CDR WHO ESTABLISHED THE SUPPORT RELATIONSHIP
WITH WHOM SHOULD LIAISON BE ESTABLISHED?	SUPPORTED UNIT	AS REQUIRED	AS REQUIRED AND THE REINFORCED ADA UNIT	AS REQUIRED AND THE REINFORCED ADA UNIT
WITH WHOM SHOULD COMMUNICATIONS BE ESTABLISHED?	SUPPORTED UNIT	AS REQUIRED	AS REQUIRED AND THE REINFORCED ADA UNIT	AS REQUIRED AND THE REINFORCED ADA UNIT

### ■ COMMANDER RELATIONSHIPS ■

(1) *Operational control.* When an ADA unit is OPCON to another unit, the parent organization retains administrative, training, and logistic responsibilities unless modified by the order establishing the relationship. Operational control would be appropriate for tactical operations of generally short duration requiring dedicated air defense. A unit is normally OPCON to another for a specific period of time or until a specific mission is accomplished, at which time the ADA unit reverts to control by its parent unit.

(2) *Attachment.* When an ADA unit is attached (atch), the supported force provides administrative and logistic support to the ADA unit. An ADA unit might be attached to a maneuver unit going on an extended, isolated operation where the parent ADA battalion could not provide effective support.

# ADA WEAPONS SYSTEMS PLANNING FACTOR

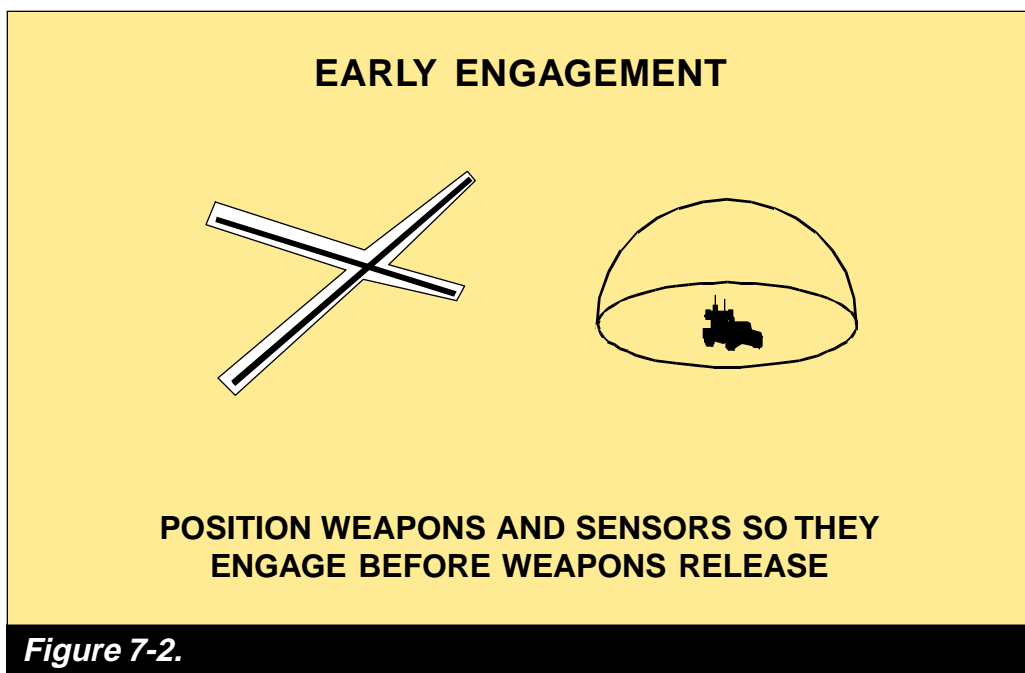
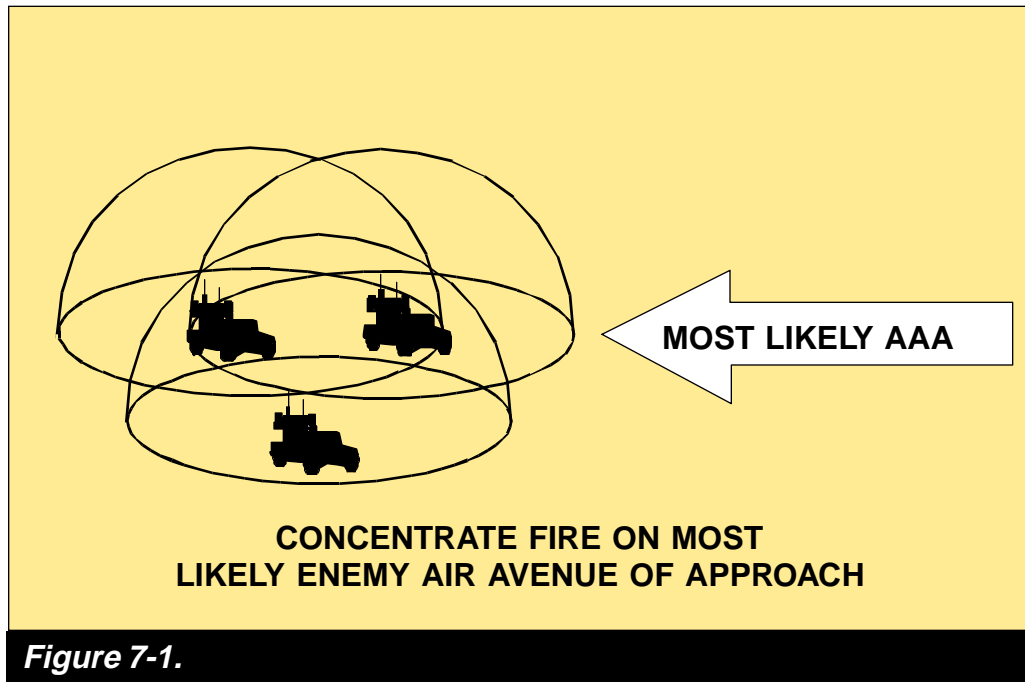
	Personnel Crw/Sec/ Plt/Btry	Armament Ammo Basic load	Acquisition range	Engagement range	Engagement altitude	Mutual Spt dist Overlapping fire distance	Time to fire/crw drill	March order time	Emplace- ment time	Reload time	Emergency Disarm Time
Avenger	2men/Avgr 4Avgr/Plt 6Avgr/Plt	8 MsIs	Visual/FL IR: 9-10 Km	4 km+	3 km+	3 km 4 km	Tgt Engmnt 8 sec	6min 30 sec (w RCU deployed)	5 min 30 sec (w RCU deployed)	7 min	Wait 1 hour to standard no time limit
Bradley Stinger Fighting Vehicle	5 men/BSFV 4 BSFV/Plt 2Plt/Btry <sup>1</sup>	6 Stgr MsIs 5 TOW MsIs 300 Ready 600 Stowed	Visual/IR Scope	Stng 4 km TOW 3.7 Km 25 mm 1.7 km COA x 900m	3 km+	2 km 4 km	Stng 10 sec TOW 45 sec 25mm 20 sec	6 min	Hasty 10 sec Reg: 6 min	Stng 7 min 25mm 10 min TOW 2 min	Wait 1 hour to standard no time link
CORPS SAM	90-95 pers	4-8 MsIs	120 km	40 km	low to medium	N/A N/A	N/A	15 min	15 min	15 min	N/A
Hawk	42 per/AFP 2 AFP/Btry 124 per Btry	36 msIs/plt 72 msIs/btry	80 km	40 km	15 km	20 km 40 km	20 min	1 hour from release time	90 min 45 from emplace 45 to fire	10 min	Misfire: 30 min Hangfire: 2 hours
Patriot	92 per/btry 1chr plt: 27 fire ctrl: 22 maint plt: 31 HQ: 12	32 msIs/btry	160 km	160 km	Classified	15 km 20 km (METT-T)	60 min	1 hour from release time	As per TSOP or OPORD	60 min	Wait 1 hour to standard no time limit
Stinger	2 man/tm 5 tm/sec 2 sec/plt	6 msIs/tm 4 wpn rds 2 msIs rds	Visual	4 km+	3 km+	2 km 4 km	Foot march 10 sec mounted 10 sec	Team 5 min	Team 10 sec	9 min	Wait 1 hour 670 ft; no time limit
THAAD	110 per btry	20 msIs/btry	500 km	200 km	Classified	N/A N/A	15 min	1 hour from release time	1 hr	15 min	N/A

1. Heavy Div: 2 BSFV Plts & 1 Stinger Plt per Battery.

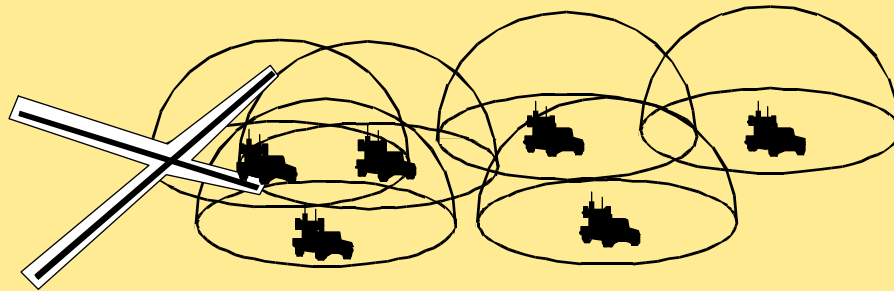


## ADA EMPLOYMENT GUIDELINES

Employment guidelines apply when planning and positioning ADA resources. METT-T determines which guidelines apply to a given situation.



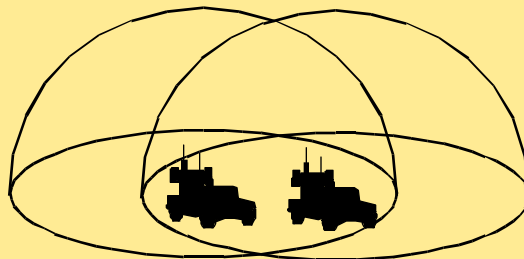
## DEFENSE IN DEPTH



POSITION WEAPONS SO THREAT COMES UNDER  
INCREASING VOLUME OF FIRE

*Figure 7-3.*

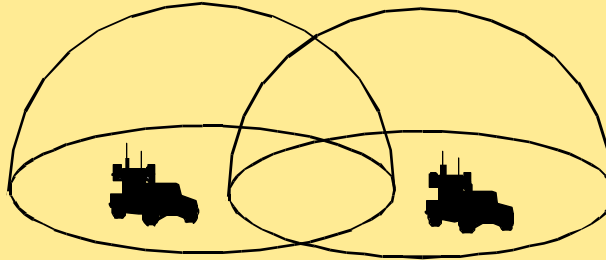
## MUTUAL SUPPORT



FIRES OF ONE WEAPON CAN ENGAGE TARGETS  
IN DEAD ZONE OF ADJACENT WEAPON

*Figure 7-4.*

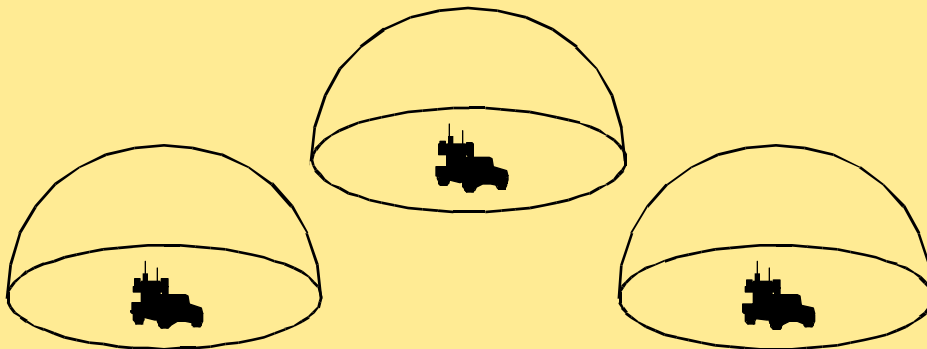
## OVERLAPPING FIRES



ENGAGEMENT ENVELOPES OF  
BOTH WEAPONS OVERLAP

*Figure 7-5.*

## BALANCED FIRES



WEAPONS POSITIONED TO DELIVER EQUAL  
VOLUME OF FIRES IN ALL DIRECTIONS

*Figure 7-6.*